DOCUMENT RESUME

ED 362 320 PS 021 795

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TITLE The Effects of Prenatal Drug-Exposure on Toddlers' Temperament, Development and Play Behavior.
PUB DATE Mar 93
NOTE 31p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (60th, New Orleans, LA, March 25-28, 1993).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *At Risk Persons; Blacks; Child Abuse; *Child Development; Child Neglect; Cocaine; Comparative Analysis; *Drug Abuse; Foster Care; Personality; Play; Preschool Education; *Toddlers
IDENTIFIERS African Americans; *Fetal Drug Exposure

ABSTRACT

This study compared 17 toddlers identified as prenatally exposed to cocaine (along with marijuana, alcohol, or nicotine), with another group of 10 toddlers with no prenatal exposure. All subjects were African-American, 1-3 years of age, and in foster care. Toddlers were age- and gender-matched and compared on measures of temperament, development, growth and play behavior. There were no group differences in temperament, growth, and play behavior, but significant differences in development. The drug-exposed toddlers exhibited higher levels of development than the nonexposed toddlers. A majority of both groups, however, scored below age level on standard development measures. These results may be attributable to the fact that the comparison group was comprised of high-risk children placed in foster care primarily due to parental abuse and neglect. Findings also suggest that the effects of prenatal drug exposure are similar to developmental outcomes experienced by other high-risk groups of children. Contains 48 references. (Author/MDM).

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The Effects of Prenatal Drug-Exposure on Toddlers' Temperament, Development and Play Behavior

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Permission for this study was granted by the Circuit Court of Jackson County, Missouri. Special thanks go to Pat Brown of the Missouri Division of Family Services, and Annette Stanton of the University of Kansas.

Paper based on a presentation at the biennial meeting of the Society for Research in Child Development, New Orleans, March 1993.

Running Head: THE EFFECTS OF PRENATAL DRUG-EXPOSURE ON TODDLERS

ABSTRACT

There is scant information about possible long-term effects of prenatal exposure to cocaine. This study compared 17 toddlers identified as prenatally exposed to cocaine (along with marijuana, alcohol, or nicotine) with another group of 10 toddlers with no prenatal exposure. All subjects were African-American, between 1-3 years of age, and in foster care. Toddlers were age and gender matched, and then compared on measures of temperament, development, growth, and play behavior. There were no group differences in temperament, growth, or play behavior. Significant differences were found in development, with the toddlers who had been prenatally exposed to cocaine more advanced. However, a majority of both groups scored below age level. These results may be attributable to the fact that the comparison group was also comprised of high-risk children, placed in foster care primarily due to parental abuse and neglect. This study suggests that the effects of prenatal drug exposure are similar to developmental outcomes experienced by other high-risk groups of children.

The Effects of Prenatal Drug-Exposure on Toddlers' Temperament, Development and Play Behavior

The National Institute on Drug Abuse (NIDA) estimates that 6 million women of childbearing age are currently using illicit drugs such as crack cocaine, heroin, PCP, metamphetamines, and barbiturates (Office of the Inspector General (OIG), 1990). It is further estimated that 375,000 infants are born yearly to drug-abusing women with 100,000 of these prenatally exposed to cocaine (OIG, 1990). Because of the potential detrimental effects on unborn children, substance abuse by women is now considered a major social issue, gaining attention from the media, the government, and the scientific community.

Although often thought to be simply an urban, inner-city problem, in reality prenatal substance abuse cuts across all classes, races, and geographic locations. Chasnoff, Landress, and Barrett (1990) found that incidences of drug use by pregnant women in Pinnellas County, Florida were 16.3% for public clinic patients and 13.1% for private patients, with similar incidences for African-American and Caucasian women.

The National Association for Perinatal Addiction Research and Education (NAPARE) surveyed 36 hospitals nationwide and found an overall rate of 11% of infants affected by substance abuse (Chasnoff, 1989b). Although the incidences ranged from .4% to 27%, it appears that this variability was related to how stringent the individual hospitals were in assessing neonatal drug exposure (Weston, Ivins, Zuckerman, Jones & Lopez, 1989).

Although the patterns of abuse of alcohol, marijuana, and heroin by women have changed very little over the last decade, their use of cocaine and crack has been rapidly rising (Chasnoff, 1989b). (Women who abuse cocaine also show increased use of nicotine, alcohol, and marijuana which may also threaten infant outcome.) When ingested by pregnant women, cocaine causes vasoconstriction of the placenta; while this may limit the amount of cocaine passed to the fetus, it also serves to limit the amount of blood--and hence oxygen--the fetus receives. Although drug toxicology does not distinguish between cocaine and crack, some researchers suggest that the potency and purity of crack may intensify these effects (Cherukuri, Minkoff, Feldman, Parekh, & Glass, 1988). Although not conclusive, research strongly suggests that cocaine may negatively impact the gestation, the birth process, and the subsequent development of infants who are prenatally exposed.

Many studies have documented intrauterine growth retardation in fetuses exposed to cocaine (Ahmed, Spong, Geringer, Mou, & Maulik, 1989; Bingol, Fuchs, Diaz, Stone, & Gromisch, 1987; Chasnoff, Griffith, MacGregor, Dirkes, & Burns, 1989; van de Bor,

Walther, & Sims, 1990). Other researchers have found that infants exposed to crack evidence significant birthweight deficits (Bateman, Ng, Hansen, & Heagarty, 1993; Kaye, Elkind, Goldberg, & Tytun, 1989). Using stepwise regression analyses, Oro and Dixon (1987) found cocaine-related growth retardation to be greater than would be predicted by other maternal risk factors. Reduced placental blood flow has also been hypothesized to disrupt organogenesis (Bingol et al., 1987), resulting in genitourinary malformations (Chasnoff, 1989a) and limb reductions (Hoyme et al., 1990). These studies suggest that cocaine may have teratogenic effects on the developing fetus.

The abrupt elevation in maternal blood pressure following ingestion of cocaine has been implicated in an increased risk of abruptio placentae (Bingol et al., 1987; Chasnoff et al., 1989; Hume, O'Donnell, Stanger, Killam, & Gingras, 1989; Oro & Dixon, 1987). Other birth complications associated with cocaine abuse include premature labor, precipitous labor, and fetal meconium staining (Ahmed et al., 1989; Chasnoff et al., 1989; Oro & Dixon, 1987; Rodning, Beckwith, Howard, 1989). These complications in and of themselves are serious threats to fetal mortality and morbidity.

Many of the effects of prenatal cocaine exposure are similar to those found with other substances, such as nicotine, heroin, and alcohol. However, cocaine also appears to place infants at risk for cocaine-specific problems such as cerebral infarction and intracranial hemorrhage (Chasnoff, Bussey, Savich, & Stack, 1986; van de Bor et al., 1990; Dixon & Bejar, 1990).

In the past, it was mistakenly believed that cocaine was not an addictive drug, and hence users had no physiological withdrawal syndrome and symptoms. However, it appears that some infants prenatally exposed to cocaine experience mild withdrawal symptoms (Ahmed et al., 1989; Chasnoff & Griffith, 1989; Oro & Dixon, 1987), evidenced by jitteriness, irritability, high respiration and heart rates, and feeding problems (Chasnoff, 1989a; LeBlanc, Parekh, Naso, & Glass, 1987; Oro & Dixon, 1987; Parker et al., 1990; Schneider & Chasnoff, 1987).

Researchers consistently have found that infants prenatally exposed to cocaine perform poorly on neonatal neurological assessments (Chasnoff, 1989a; Cherukuri et al., 1988; Dixon, Coen, & Crutchfield, 1987); exhibit depressed interactive abilities and poor organizational responses to environmental stimuli (Chasnoff, 1989a); and manifest behavioral state disorganization (Hume et al., 1989). More deleterious neurological sequelae have been reported for infants exposed to crack (Kaye et al., 1989).

It is unclear whether these subtle neurological differences are merely part of a withdrawal pattern or represent potentially long-term deficits. Chasnoff (1989a) found that by one month, motor, orientation, and state regulation had improved; however, orientation and state behavior remained below normative levels. In another study, increased muscle tone persisted in some 4-month-old infants (Schneider & Chasnoff, 1987). Doberczak and colleagues (1988) found that abnormal electroencephalographic assessments of 17 infants had normalized within 3 to 12 months. However, a majority of the infants in this study showed no such irregularities. Which infants exposed to cocaine are at risk for these neurological phenomena, and under what conditions, has yet to be clearly identified.

Not all researchers have found effects in infants identified as prenatally exposed to cocaine. Although only assessing withdrawal symptomotology, Madden, Payne, and Miller (1986) did not discern a noticeable pattern of symptoms. In a broader study, researchers found no significant differences between cocaine-exposed and control subjects on growth parameters, birth complications, or neonatal behavioral assessments (Richardson & Day, 1987). Unlike many of the previously cited studies, the mothers in this study were light to moderate users of cocaine. Thus, the morbidity associated with prenatal exposure to cocaine is likely dose-related.

Although much is known about the neonatal effects of prenatal cocaine exposure, there is scant literature beyond the first year of life. Rodning, et al. (1989) found that toddlers who had been prenatally exposed to cocaine and other drugs had significantly lower developmental scores (although in the normal range), less organized and representational play, and poorer attachment to caregivers than a comparison group of developmentally at-risk children. In another study, the mean scores on the Bayley Scales of Infant Development of two-year-olds who had been prenatally exposed were comparable to those of a matched control group (Chasnoff, Griffith, Freier, & Murray, 1992). However, the toddlers who had been drug-exposed evidenced greater variability in their scores. Other researchers have suggested that developmental outcomes for toddlers who were prenatally exposed to cocaine range from rare, significant developmental problems, to subtle learning or behavioral problems, to apparently normal development (Schutter & Brinker, 1992; Zuckerman, 1991).

Certainly prenatal exposure to cocaine presents a potential biological assault to the fetus, with many risks for the infant. However, this is likely to be exacerbated by coexisting environmental and psychosocial disadvantages. The lifestyle of a cocaine abusing parent often leads to dysfunctional parenting,

with the focus on drug procurement rather than caring for the child. In addition, these infants are reported to have difficult behavioral patterns which may negatively affect caregivers (Thurman & Berry, 1992). Some reports indicate that crack, in particular, induces some parents to violent and abusive behavior (Besharov, 1990). The combination of biologic vulnerability and caretaker inadequacy increases the chances that the child will become a "caretaking casualty" (Schutter & Brinker, 1992) and at risk for abuse and/or neglect. Hence, many of these children require out-of-home placement, either in kinship or foster care.

The increase in infants identified as prenatally exposed to drugs has led to a dramatic rise in the demand for foster care (Ruff, Blank, & Barnett, 1990; Walker, Zangrillo, & Smith, 1991). On any given day in the United States, as many as 360,000 children are in foster care; this is up from 225,000 in the early 1980's and is primarily attributed to the explosion in crack abuse (National Commission on Family Foster Care, 1991). Some communities have reported as much as a 3000% increase over a five year period in the number of drug-related dependency petitions in the Child Welfare System (McCullough, 1991).

The purpose of foster care historically has been to offer a safe place for children to live until their biological parents are able to properly care for them. However, children in foster care have always been very vulnerable, suffering high rates of medical, emotional, and developmental problems (Halfon, Berkowitz, & Klee, 1992; Simms, 1989). These children must cope with the separation from one or both parents (which is rarely painless); adjustment to a new home; often the lingering effects of abuse and neglect; often multiple foster home placements; and a very uncertain future, given that foster care is by definition "temporary."

The increase in demand for foster care relates to many social problems apart from substance abuse (i.e., poverty, homelessness, single parents, etc.). However, young children endangered by, and infants prenatally exposed, to drugs comprise the fastest growing segment of the foster care population (McCullough, 1991). Further, it has been estimated that up to 80% of the infants identified as prenatally exposed will be placed in foster care in their first year of life if their mothers do not undergo treatment for addiction. A recent national study found that African-American children in foster care due to parental drug abuse were placed younger, stayed longer, and were less likely to be reunited with their biological parent than those from non-drug-abusing families (Walker, Zangrillo, & Smith, 1991).

Clearly, foster care is a salient factor in the growth and development for many children who have been prenatally exposed to cocaine. The present study focused solely on toddlers in foster care, comparing the temperament, development, play behavior, and physical growth of toddlers identified as prenatally exposed to cocaine with a group of toddlers placed in foster care for reasons other than parental substance abuse. Given that those toddlers in foster care due to prenatal exposure to cocaine have suffered both biologic and caretaking casualties, it was hypothesized that: (a) more of the toddlers who were prenatally exposed to cocaine would be difficult temperamentally, (b) toddlers who were prenatally exposed to cocaine would show more developmental delays than the other toddlers in foster care, (c) toddlers who were drug-exposed would evidence more frequent difficult or negative behavior in the play situations, and (d) toddlers who were drug-exposed would be shorter in stature and have smaller head circumference than the other toddlers.

Method

Subjects

Subjects were 27 toddlers in foster care. All subjects were African-American. Seventeen of the toddlers (10 females, 7 males) had been exposed prenatally to drugs. The mean age of the drug-exposed subjects was 20.86 months (*SD* = 4.64). Subjects were identified by the foster care agency as drug-exposed due to either positive toxicology reports at birth, documentation provided by the foster caregiver, or the mother's self-report of drug use during pregnancy. All subjects in the drug-exposed group had been exposed to cocaine. Fourteen of these subjects also were known to have been exposed to alcohol, nicotine, and/or marijuana. This information was not known for the remaining three subjects. The mean age at time of placement in the foster care system was 3.93 weeks (*SD* = 5.49), with a range of birth to 16 weeks. The mean number of placements for drug-exposed subjects was 1.67 (*SD* = .93), with a range of 1 to 4 placements.

The comparison group consisted of 10 toddlers (5 males, 5 females) in foster care for reasons other than prenatal drug-exposure. Five of the subjects were placed because of abuse in the biological home, two because of neglect, and one because the mother was psychotic. This information was not available for the other two subjects in this group. The mean age of the comparison group was 19.15 months (*SD* = 4.85). Subjects in the two groups were matched by age ± 2 months, and gender (when possible). Four additional comparison subjects were dropped from analyses because the foster parents strongly suspected that their children had been exposed to drugs prenatally; however, they had no documentation to that effect. The comparison group subjects

had been placed in foster care at a mean age of 29.7 weeks (SD = 27.3), with a range from birth to 88 weeks. These subjects had a mean of 2.1 placements (SD = .99), with a range of 1 to 4.

An additional 11 subjects were contacted but did not participate in the study. Of those declining to participate, five were caregivers of drug-exposed toddlers and six were caring for toddlers who had not been identified as drug-exposed. Foster mothers declined to participate because of the child's health (1), severe developmental disabilities (2), time constraints (7), or lack of interest (1). See Table 1 for characteristics of sample.

Insert Table 1 here

Procedures

All potential subjects were identified by the state agency responsible for foster care. Approval from county, state, and the judicial system was given prior to the contact of foster caregivers. All foster caregivers of children between the ages of 12 to 36 months were initially contacted. The foster care agency contacted the foster parents authorizing their participation. A second letter was sent explaining the study and requesting permission and consent. Foster parents were told that the purpose of the study was to assess toddlers in foster care. No mention of drug exposure was made. Subsequently, potential subjects were contacted by telephone and a home visit was scheduled at the foster caregiver's convenience for those agreeing to participate.

Approximately one week prior to the home visit, the foster caregiver was sent a packet containing a consent form and the written measures. The letter also stressed that the caregivers should not disclose any other information about the child or the biological mother until the completion of the home visit. Upon arrival for the home visit, the researcher established rapport with the toddler. A research assistant engaged the child in a standardized play situation designed to elicit the best performance of the child. Four age appropriate, gender neutral toys (cloth activity book, shapes puzzle, blocks, and ball) were presented sequentially for 2 minutes each. The child's behavior was observed and coded for a total of 8 minutes. Two observers coded the behavior observations. Interrater reliabilities for the four behavioral categories observed averaged 99%, 94%, 87%, and 94% respectively.

A free play situation involving a black baby doll, a blanket, and a doll bottle, followed the behavior coding. These

toys were placed on the floor close to the child, who was told that "the baby is crying." The child's reactions were then observed and coded. At the conclusion of the doll play, both observers independently rated the reinforcement value of the toddler using a Likert scale of 1-5, with 1 indicating extremely rewarding, and 5 indicating extremely aversive.

Measurements of the child's height and head circumference were taken. The Child Health Summary was used to ascertain health history and birth information for each subject. Completed questionnaires were collected from the foster caregiver at the time of the home visit.

Measures

Play observation (author-constructed) behavior variables coded were (a) engagement with the player, (b) vocalization, (c) task persistence, and (d) behavioral state changes. The behaviors were coded in continuous 5 second intervals for a total of 24 intervals (or 2 minutes) per toy. A mean score on each metric of all four variables was derived for each subject by combining their ratings across toys. A prerecorded tape announced each coding interval. The observers used a small Sony Walkman with unobtrusive ear phones to lessen the potential for the toddler's distraction by the equipment. Following each specific toy, the activity level of the child was rated as low, moderate, or high for the specific toy. For all toys except the ball, the player and child sat on the floor in close proximity to the observers. Generally, the ball play required greater distance for the interaction.

During the free play with the doll, the child was observed for (a) empathetic and caregiving behavior toward the doll, (b) inattention toward the doll, and (c) rough or "cruel" treatment of the doll.

The Carey Toddler Temperament Scale (Fullard, McDevitt & Carey, 1984) is a 97-item parental-rating scale designed to identify the characteristic temperaments (easy, difficult, slow-to-warm) of children from the ages 1-3 years. The child's characteristic behaviors are scored on a 6-point Likert scale. The nine temperamental dimensions assessed are rhythmicity, approach, adaptability, intensity, mood, activity level, persistence, threshold level, and distractibility.

The temperamentally Easy child scores as rhythmic, approaching, adaptable, mild, and positive. In contrast, the temperamentally Difficult child scores as arrhythmic, withdrawing, nonadaptable, intense, and negative. Those children who score as temperamentally Slow-to-Warm evidence low activity,

withdrawal, nonadaptability, and mild but negative mood. Those children without the above constellations of characteristics score as Intermediate, with lower scores associated with Easy, and higher scores suggestive of more Difficult categorization.

One-month test-retest reliability was reported to be a median .81, ranging from .69 to .89. Split-half reliabilities were computed using the K-R 20 formula. For the one-year old sample, alpha coefficients ranged from .59 to .86, with a median of .70. For the two-year-old sample, alphas ranged from .53 to .85, with a median of .72 (Fullard et al., 1984).

The Minnesota Child Development Inventory (MCDI) (Ireton & Thwing, 1974) is a 320-item questionnaire in which the caregiver's observations about the child are used to measure development. By answering yes/no to these statements, a concise picture of the child's development is suggested on eight developmental scales: General Development, Gross Motor, Fine Motor, Expressive Language, Comprehension-Conceptual, Situation Comprehension, Self-Help, and Personal-Social.

For the age range of the sample in the present study, internal consistency (alpha) reliabilities ranged from .92-.93 for General Development, .65-.80 for Gross Motor, .40-.71 for Fine Motor, .88-.91 for Expressive Language, .78-.84 for Self-Help, .89-.90 for Comprehension-Conceptual, .61-.79 for Situation Comprehension, and .77-.86 for Personal-Social. The General Development Scale is the most age-discriminating.

For the purposes of statistical analyses, each child's performance on the MCDI was converted in this study to a developmental quotient by dividing the developmental age by chronological age, and then multiplying by 100. Although the standard deviation of this ratio does not remain constant with age, the limited age range of the present sample should mitigate this potential problem.

Results

Demographic Variables

Preliminary analyses were conducted on demographic data to test for initial group or gender differences. There were no significant group or gender differences on *t*-tests which compared the toddlers' mean age at assessment. There were no significant differences in height or head circumference between groups or genders. Birth information was not available from either the foster mother or foster care agency for most of the non-exposed toddlers and many of the drug-exposed toddlers on amount of prenatal care, birth weight, gestational age, amount of prenatal

exposure to nicotine, and the foster mothers' race, education and economic status. There was a significant group difference on the mean age of initial placement in the foster care system (t (25) = 3.85, $p < .01$). Because of the variance within groups, a 2 x 2 Chi Square analysis further examined group differences in age of placement dichotomized into 1) at birth, or 2) after birth. This was also significant (Maximum Likelihood χ^2 (1, $n = 27$) = 6.78, $p < .01$) with more of the drug-exposed toddlers placed at birth. Fully 59% of the drug-exposed toddlers were placed in foster care at birth, compared to 20% of the non-exposed toddlers. However, there was no significant gender difference in time of placement (Maximum Likelihood χ^2 (1, $n = 27$) = .90, $p > .05$).

Demographic data on foster caregivers' education and economic status were analyzed by a 2 x 2 Chi Square design. Education was dichotomized into 1) high school graduate or less, and 2) education beyond high school. A Maximum Likelihood χ^2 (1, $N = 27$) = .56, $p > .05$ showed no significant group differences. Income level was dichotomized into 1) less than $20,000, and 2) greater than $20,000. Again, there were no significant group differences (Maximum Likelihood χ^2 (1, $N = 27$) = .127, $p > .05$). Finally, a comparison of the mean age of the foster caregivers was not significant (t (25) = -.19, $p > .05$).

Carey Temperament Variables

A 2 x 3 Chi Square showed no statistically significant differences between the drug-exposed and comparison groups on the Carey Toddler Temperament Scale (Maximum Likelihood χ^2 (2, $N = 24$) = 6.68, $p > .05$). Although there are three main categories of temperament designated by the Carey Toddler Temperament Scale (Easy, Difficult, or Slow-to-Warm), most of the toddlers in this study fell into an intermediate category (Intermediate-Low) which is similar to Easy. Because of this, the test for group differences only included the categories of Easy, Slow-to-Warm, or Intermediate-Low. Five subjects in the drug-exposed group were classified as Easy, as was one subject in the comparison group. No subjects in either group were classified as Difficult; only one subject, who was in the drug-exposed group, was classified as Slow-to-Warm. There were no gender differences in classification (see Table 2).

Insert Table 2 here

Possible group and gender differences on the nine individual dimensions of the temperament scale were examined with separate multivariate analyses of variance. (MANOVAs). The multivariate F was significant for group (Hotellings F (9,14) = 1.72, $p < .05$),

but not for gender (Hotellings F (9,14) = 9.13, $p > .05$). Differences between groups were found on the dimension of Intensity, which is defined as the strength of a child's emotional responses, (F (1,22) = 6.00, $p < .05$), with the drug-exposed toddlers showing stronger emotional responses. However, the mean Intensity rating for both groups was below the diagnostic mean of 4.03 used to delineate strong versus mild emotional responses (drug-exposed M = 3.91, SD = .50; comparison group M = 3.43, SD = .44), indicating that, in general, these toddlers are perceived as moderate in their emotional responses.

On the dimension of Persistence, which is defined as the ability to stick with a task, the comparison group was found to be less persistent than the drug-exposed toddlers (F (1,22) = 5.34, p = .05). Both groups were above the diagnostic mean of 3.45 (drug-exposed M = 3.69, SD = .41; comparison group M = 4.13 SD = .51), although the drug-exposed group was only slightly higher. Group means and standard deviations for all the temperament dimensions are presented in Table 3.

Insert Table 3 here

Analysis of Developmental Variables

A separate MANOVA was conducted using group and gender as individual variables and MCDI scores as dependent variables. No gender differences were found on either the ratio scores or individual scales (Hotellings F (9,15) = .82, $p > .05$). However, differences between drug-exposed and comparison groups were found on some of the individual scales (Hotellings F (9,15) = 2.62, $p > .05$), but not on the overall development level as indicated by the ratio score (Univariate F (1,23) = .61, $p > .05$). The drug-exposed toddlers had a mean ratio score of 92.3, SD = 20.79. In contrast, the comparison group had a mean score of 86.80, SD = 13.71. The drug-exposed toddlers evidenced greater variance in their performance (55 to 138 for drug-exposed, as compared to 64 to 105 for the comparison group).

Group differences occurred on several scales, with the drug-exposed toddlers more developmentally advanced on each scale. Although it appears to contradict the nonsignificant difference found on the ratio scores, a significant difference was found on the General Development scale (Univariate F (1,23) = 4.26, $p > .05$). The mean score on the General Development Scale was 53.6 (SD = 18.4) for the drug-exposed group and 40.0 (SD = 11.7) for the comparison group. Univariate F tests also indicate significant group differences on the Conceptual Comprehension scale (F (1,23) = 6.23, $p < .05$), Expressive Language scale (F

(1,23) = 4.74, $p < .05$), and the Personal-Social scale (F (1,23) = 7.25, $p = .01$). Table 4 contains the mean scores on all the MCDI scales.

Insert Table 4 here

Because the MCDI individual profiles translate raw scores into age-level comparisons, Table 5 presents group performances by these categorical age-levels. As can be seen from this table, a majority of toddlers in both groups were performing below age level developmentally. However, this examination of the data also indicates that the comparison groups had more toddlers performing above age-level on the Gross Motor and Self-Help scales.

Insert Table 5 here

It is assumed that normal developmental profiles will evidence a primarily flat, linear pattern across scales. A repeated measures MANOVA with polynomial contrasts was run to examine possible group differences on the profile patterns of the MCDI. This analysis treated each scale as a repeated measure of development. A significant main effect was found for development (Hotellings F (7,17) = 7.07, $p < .01$), indicating that irrespective of group or form, the profiles of the toddlers were not flat. However, on the test for between-subjects effects, both groups were found to have similar profile patterns (F (1,23) = 3.76, $p > .06$). Although both profiles were linear to the extent that there was an overall trend of decreasing scores from first to last scales, this was not the best "fit" for the data as a whole. The best fit for the combined group has three rises and falls in scores, which follows the drop in performance on several of the scales. An interaction between group and polynomial form was also found to be significant, (Hotellings F (7,17) = 1.29, $p < .05$) with three rises and falls in scores better fitting the drug-exposed group's profile. In summary, neither group exhibited a flat developmental profile. Although similar, the profiles nonetheless also reflect the group differences on several of the scales (see Figure 1).

Insert Figure 1 here

Play Variables

The play observation variables were examined with a repeated measures MANOVA, with the play behaviors nested within the toy types. Because of the number of variables, only state changes, positive player regard, language vocalizations, and distraction from task were included in the analysis. There were no significant between-subjects effects (F (1,25) = .84, p > .05). No significant main effects were found for group or toy type, and there were no significant interactions. The toddlers in both groups were most often positively engaged with the player, and on task, throughout the assessment. However, there was greater variance in the drug-exposed group's play. The group means and standard deviations for all play variables are presented in Table 6.

Insert Table 6 here

As a manipulation check of the observation variables, activity level, elicited language, and task persistence were correlated with scale measures of these variables. There was a significant, positive correlation between high activity level (as observed in the play assessment) and a high Activity score on the Carey temperament dimension (r = .42, p < .05). The observation of language was also positively correlated with the Expressive Language scale on the MCDI (r = .48, p < .05). This correlation was strongest for the book interaction. The correlation between on-task behavior and Persistence on the Carey scale was nonsignificant; this is not surprising, given that in our assessment each toddler was greatly aided by the player in maintaining interest in the toy.

A 2 x 3 Chi Square was used to analyze possible differences in the responses to the doll. Although there were no significant between-group differences (Maximum Likelihood χ^2 (2, N = 27) = 2.0, p > .05), there were significant gender differences (Maximum Likelihood χ^2 (2, N = 27) = 6.77, p < .05). All 12 boys exhibited affectionate or caregiving behaviors toward the doll, while five of the girls acted in a disinterested or cruel manner towards the doll. However, two of the girls in this study owned a doll exactly like the one used in the play assessment. Significant differences were also found in behavior as a function of the initial placement in the foster care system when the sample was divided into two categories: a) placed at birth, or b) placed after birth (Maximum Likelihood χ^2 (2, N = 27) = 7.62, p < .05). Those children placed after birth were all affectionate toward the doll, while those placed at birth exhibited all three types of responses. Fewer of the disinterested or cruel

behaviors were evidenced as a function of increasing age. Thus, those toddlers older than 21 months, regardless of group or gender, only demonstrated nurturing behaviors.

Each child in this study received the highest rating for reinforcement value by at least one observer. One boy, who was in the drug-exposed group, received a rating of aversive (4) by one observer. All other children were rated as rewarding or extremely rewarding by both.

Post-hoc Analyses

Although not part of the original hypotheses, MANOVAs were conducted to determine if group differences found on the temperament and development measures were, in fact, due to differences in time of placement into foster care. Because there were some inconsistencies between caregivers and the foster care agency in the reported ages of initial placement into foster care, time of placement was used rather than actual age. Time of placement was divided into: a) those placed at birth, or b) those placed after birth. In order to also examine potential interactions between time of placement and group, both were treated as independent variables in the MANOVA. On the temperament dimensions, there was no significant main effect for placement (Hotellings F (9,12) = .24, $p > .05$) or significant interaction between groups and placement (Hotellings F (9,12) = 1.27 $p > .05$). Similar results were found for the MCDI scales. There was no significant main effect for placement (Hotellings F (8,14) = .409, $p > .05$) or significant interaction effect between placement and group (Hotellings F (8,14) = .17, $p > .05$). Thus, it appears that time of placement was not a factor in either temperament dimension ratings or developmental scores.

Discussion

The results of this study do not support the hypotheses, and indeed, are contradictory to them. The toddlers who were prenatally exposed did show deficits in development similar to those reported by other researchers. However, the children in this study who were prenatally exposed did not evidence difficult temperaments, were no different than the comparison group in ability to interact with the researchers, and were able to complete both a structured and free play situation. Growth measures were also comparable and within the normal range.

The finding that the toddlers who were prenatally exposed scored within the low-average range developmentally is consistent with other studies (Chasnoff et al., 1992; Rodning, et al., 1989; Wilson, McCreary, Kean, & Baxter, 1979). What is surprising, however, is that these children, who have experienced both

biologic and environmental vulnerabilities, appeared to be more developmentally advanced than the other toddlers in foster care. It appears likely that the non-drug-exposed toddlers who were placed in foster care primarily due to abuse and neglect were more adversely affected by their post-natal environments than the drug-exposed toddlers were by their prenatal environments.

Situations which place children in foster care other than drug exposure appear from these data to be deleterious to their development. It has been reported that African-American children in foster care due to parental drug use are more likely to have suffered neglect, while other African-American children placed in foster care are more likely to have been abused (Walker, Zangrillo, & Smith, 1991). In this sample, several of the children in the comparison group had been seriously injured by a parent. It is noteworthy that the toddlers who had not been prenatally exposed to drugs scored highest on the developmental scales which are least associated with environmental factors: Gross-Motor and Self-Help Skills. Ironically, in this study the language delays often reported in children prenatally exposed to cocaine were found, instead, in the comparison group. It has been well-documented that language development is adversely affected by inadequate caretaking (Jones, McCullough, & Dewoody, 1992).

Other explanations for superior (though low) performance of the drug-exposed group lie with the caretaking skills of the foster mothers. Although each of the toddlers who had been drug-exposed were, in fact, poly drug exposed, the foster mothers identified cocaine as the developmental risk for their child. It is noteworthy that each of the foster mothers caring for a toddler identified as prenatally exposed, at some time during our visit, labeled the child as a "crack baby." Their perception of the needs of a "crack baby" may elicit a different type of caretaking than provided for the other children in foster care. They may simply be working harder with a child perceived to be "fragile" and in need of more than just love and a safe home. This was reflected in their attitude about caring for a child who was drug-exposed: Many spoke of "having a mission" or "being called" to provide care. It is also likely to be very gratifying for these professional parents to see the child develop, under their efforts, beyond the stereotype of a "crack baby."

Although the "crack baby" label may not yet have limited the toddlers in this study, it does have serious implications for all children identified as prenatally exposed to cocaine. This label has been culturally-constructed from a media portrayal of "worst-case scenarios." Unfortunately, the media have simply reflected (at least an initial) bias in the scholarly literature against the publication of studies which have found no adverse

effects to prenatal cocaine exposure (Koren, Shear, Graham, & Einarson, 1990). As Schutter and Brinker (1992) eloquently discuss, the "crack baby" or "drug baby" labels are simply not useful in predicting or describing outcome. Moreover, the fallacious expectation pointed out by Heagarty (1990) that they "are destined to become a generation of learning disabled delinquents who will become a burden to society..." has the potential for a self-fulfilling prophecy to further impact the outcomes for these children. Certainly outcomes will not be improved by the attitude that these children cannot be helped, and are different from other children with developmental delays or deficits (Mayes, Granger, Bornstein, & Zuckerman, 1992).

A further danger of the "crack baby" label is the effect of such stereotypes on potential foster and adoptive parents. As the demand for such care is dramatically increasing, the supply is dwindling; the current number of available, qualified homes is down 30% since 1984 (NCFFC, 1991). Research suggests that caring for a child who was prenatally exposed to drugs is not less satisfying or different than caring for other foster and adoptive children (Barth, 1993; Soliday, McCluskey-Fawcett, & Meck, in press). Unfortunately, potential caregivers may be reluctant to take a child with this history, given the stereotype.

Limitations

Although the results of the present study raise important questions about child welfare issues, they must be interpreted with caution. A limitation was the inclusion of only African-American children. Although we know that substance abuse cuts across all classes and races, families hit hardest by the current crack epidemic are impoverished, ethnic and racial communities (Jones, McCullough, & Dewoody, 1992). Still, it was surprising to find that in Jackson County, Missouri, with a population of 640,000, the vast majority of children identified as prenatally exposed were African-American. However, this is consistent with a study in Florida which found that African-American women were ten times more likely to be reported for drug use during pregnancy (Chasnoff et al., 1990). Unfortunately, both the Carey Toddler Temperament Scale and the MCDI were standardized on largely white, middle-class samples; neither was designed for assessing African-American children in foster care.

The present study was also limited by the methodological problems inherent in this area of research including small sample size and difficulty identifying a drug-free comparison group. There was no way to ascertain the gestational age or dosage of prenatal drug exposure and there were discrepancies in the amount of information foster mothers had received about the toddlers,

with respect to family and birth histories. Other factors, such as the effects of polydrug use, maternal nutrition, and prenatal care could not be controlled within the confines of this study. However, it is likely that many of the toddlers of drug-abusing women in the present study suffered multiple disadvantages prenatally since many had been placed in foster care at birth, and others had mothers in extreme situations (e.g., murdered, murderer, prostitution, etc.). Hence, their performance cannot be attributed only to prenatal assault by cocaine and other drugs.

The differing ages of the groups when placed in foster care is consistent with a national study which found that children prenatally exposed to drugs enter care at an earlier age, stay for longer periods of time, and are less likely to be reunited with their birth parents (Jones, McCullough, & Dewoody, 1992; Walker, Zangrillo, & Smith, 1991). This will likely continue to be a factor in other studies using foster care samples. Unfortunately, the need for more methodologically sound research with foster care populations is constrained by limitations in information gathering from an increasingly overwhelmed child welfare system.

In spite of the lack of between-group differences, it is premature to conclude that the toddlers in this study who were drug-exposed do not--or will not--have problems. Over one-half performed below age level on most of the developmental scales. Some researchers suggest that long-term sequelae will not surface until school age (Van Dyke & Fox, 1990; Chasnoff et al., 1992). However, the developmental delays of the toddlers who were drug-exposed were not different from those of other at-risk groups of children.

The etiology of a developmental problem may be helpful, but not always certain. Hence, we need to assess each child as an individual, not a stereotype, and tailor interventions accordingly. Even the most impaired of those prenatally exposed to cocaine are no different behaviorally from other neurologically impaired infants (Schutter & Brinker, 1992). By the same token, there are no empirical data to support the need for unique interventions for these children. By attributing developmental consequences solely to prenatal drug-exposure, society becomes exempt from addressing the deeper social issues of poverty, family violence, lack of health care, and paternal responsibility; these environmental assaults jeopardize the futures of many more children than those who were drug-exposed. Without overlooking the needs of children who were prenatally exposed to drugs, we must not sentence them to a troubled future--or ignore the needs of other vulnerable children.

Further, multi-site studies may help to illuminate the mechanisms by which biological assaults are mediated by the foster care experience. With foster care a reality for increasing numbers of children, measures designed specifically to assess this population may provide a clearer picture of the challenges they face--and the resources they possess.

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TABLE 1

Characteristics of Sample (n = 27)

Toddler Variables	Drug	Non-drug
(Data unavailable for some toddlers)		
M age in mo.	20.8	19.5 mo.
n - (all black)	17	10
gender (female)	10 (59%)	5 (50%)
gestation--37 weeks or more	10 (59%)	3 (30%)
under 37 weeks	5 (29%)	1 (10%)
birth wt.--over 2499 g.	7 (41%)	3 (30%)
1500-2499 g.	3 (18%)	1 (10%)
under 1500 g.	3 (18%)	0 (0%)
prenatal care--none	6 (35%)	0 (0%)
minimal	4 (24%)	3 (30%)
adequate	1 (6%)	1 (10%)
initial placement--birth	10 (59%)	2 (20%)
before 6 months	7 (41%)	3 (30%)
after 6 months	0 (0%)	5 (50%)
number of placements--1	10 (59%)	3 (30%)
2-3	6 (35%)	6 (60%)
4+	1 (6%)	1 (10%)

Caregiver Variables	Drug	Non-drug
race (black)	9 (53%)	5 (50%)
over age 35	12 (71%)	7 (70%)
under age 35	5 (29%)	3 (30%)
education--10th grade	3 (18%)	3 (30%)
high school graduate	8 (47%)	2 (20%)
high school graduate plus	2 (12%)	4 (40%)
degree	4 (23%)	1 (10%)
marital status (single)	9 (53%)	5 (50%)
income-- under $10,000	5 (29%)	--
$10,000 - $15,000	1 (6%)	2 (20%)
$15,000 - $20,000	2 (12%)	2 (20%)
$20,000 - $30,000	2 (12%)	1 (10%)
$30,000 - $50,000	5 (29%)	2 (20%)
over $50,000	2 (12%)	3 (30%)

TABLE 2

Temperament Categories

	Drug (n = 14)	Non-drug (n = 10)
Intermediate-low	8 (57%)	9 (90%)
Easy	5 (35%)	1 (10%)
Intermediate-high	0	0
Difficult	0	0
Slow-to-Warm	1 (7%)	0

TABLE 3

Mean Scores by Group on Carey Temperament Dimensions

Dimension		Drug	Non-drug
Activity	M	3.90	3.53
	SD	.63	.45
Rhythmicity	M	2.72	3.02
	SD	.54	.36
Approach	M	3.04	3.51
	SD	.75	.76
Adaptability	M	3.31	3.19
	SD	.56	.44
Intensity	M	3.91	3.43
	SD	.50*	.44
Mood	M	2.99	3.06
	SD	.56	.35
Persistence	M	3.69	4.13
	SD	.41*	.51
Distractability	M	3.97	3.78
	SD	.46	.48
Threshhold	M	3.51	3.39
	SD	.93	.32

* $p < .05$

NOTE: Higher scores indicate increasing activity, arrhythmicity, withdrawal, slower adaption, stronger emotional reactions, lower persistence, increasing distractibility, and lower threshhold.

TABLE 4

Mean Group Scores on the MCDI

Scale		Drug	Non-drug
General Development	M	53.6*	40.0
	SD	18.4	11.7
Gross Motor	M	20.33	19.8
	SD	5.7	3.6
Fine Motor	M	23.8	23.5
	SD	3.9	3.3
Conceptual Compreh.	M	15.9*	9.0
	SD	7.5	5.5
Situation Compreh.	M	19.66	16.9
	SD	5.5	4.2
Expressive Language	M	28.0*	19.1
	SD	11.7	6.5
Personal-Social	M	17.33*	11.4
	SD	6.4	3.3
Self-Help	M	15.07	13.7
	SD	4.99	4.4

* for significant difference

TABLE 5

Group Performances on MCDI Scales

	I	II	III	IV	V	
GENERAL DEVELOP.	27%	20%	27%	13%	13%	drug
	10%	20%	40%	10%	20%	non-
GROSS MOTOR	47%	06%	13%	13%	20%	drug
	60%	0	20%	10%	10%	non-
FINE MOTOR	27%	0	20%	06%	47%	drug
	20%	10%	40%	20%	10%	non-
CONCEPT. COMPRH.	33%	0	53%	13%	0%	drug
	20%	0	20%	30%	30%	non-
SITUATION COMPRH.	27%	0%	27%	13%	33%	drug
	10%	10%	30%	10%	40%	non-
EXPRESS. LANG.	40%	06%	06%	20%	27%	drug
	0%	10%	40%	20%	30%	non-
PERSONAL/ SOCIAL	33%	0	40%	06%	20%	drug
	10%	0	40%	0	50%	non-
SELF- HELP	27%	13%	27%	20%	13%	drug
	50%	10%	20%	10%	10%	non-

I - above age level
II - at age level
III - below age level
IV - 20% below age level
V - 30% below age level

TABLE 6

Mean Frequencies of Play Variables

	Drug		Non-drug	
Variable	Mean	SD	Mean	SD
State Changes	3.94	4.04	.70	1.34
+ Player Regard	81.65	19.91	85.60	8.14
0 Player Regard	11.53	15.39	9.50	6.72
- Player Regard	2.65	8.45	.90	2.85
No Vocalization	66.88	20.99	70.40	20.13
Pos. Affect	20.40	6.0	21.30	3.24
Neg. Affect	.65	1.97	1.30	3.20
Language	20.18	17.54	13.10	16.10
On Task	81.18	16.07	83.40	8.53
Inattentive	.71	2.02	.0	.0
Distracted	12.06	14.46	10.90	7.28
Oppositional	2.65	7.96	1.70	2.87

Means averaged across toys and subjects
over a total of 96 intervals.

FIGURE 1
Group Profiles on the MCDI